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for the determination of the common minerals from an examination of their physical properties.

American mineralogists will look forward with interest to the textbook of mineralogy which is now in preparation for MacMillan & Co., by Mr. H. A. Miers, of the British Museum.

W. H. Hobbs.

PETROGRAPHY.[1]

Granite Inclusions in Gabbro.—Inclusions of granite in the gabbro of the Cuillin Hills, Skye, England, afford excellent illustrations of the effects produced by the fusion of acid rocks on a molten basic one. The granite in question is reported by Judd[2] to be a biotite or a hornblende-biotite variety. Near the periphery of the mass the biotite and hornblende are replaced by augite, and granophyre is developed in the interstices between the phenocrysts. The gabbro, in its passage upward, broke fragments from this granite, especially from its peripheral portions, and changed them completely. The granophyric intergrowth was fused and changed to a rhyolitic glass, marked by flow lines and filled with spherulites and lithophysae. In a few instances, some of the larger granophyre groups have escaped complete fusion, in which case, their remnants remain as nuclei of large compound spherulites. Imbedded in the glass are the large crystals of the granite. The quartzes have been cracked, and into the cracks glassy material has been pressed. The feldspars are also cracked, and in the crevices thus formed, secondary feldspars have been deposited. The original augites have disappeared, and in their places are aggregates of magnetite and other secondary products. The most interesting features of the altered inclusions are the spherulites. Simple and composite varieties are both common, and the trichitic kinds described by Cross are also met with. The centers of the spherulites are nearly always grains of quartz or of orthoclase, or groups of granophyre, as already mentioned. Pyrite and fayalite are both new products of the metamorphic action.

The Geology of Pretoria, South Africa.—A long and interesting account of the geology of the gold fields near Pretoria, in the

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[1] Edited by Dr. W. S. Bayley, Colby University, Waterville, Maine.

[2] Quart. Jour. Geol. Soc., xlix, p. 175.

South African Republic, has appeared under Molengraaf's[3] name. The major portion of the paper is taken up with descriptions of the geological features of the region. There are in it, however, several items of petrographic interest. The oldest formation of the region embraces granites and crystalline schists. The former rock-type includes tonalites and orthoclase-plagioclase-microcline granites. In some places the rocks show evidences of dynamic metamorphism. Among the rocks associated with the granite are sericite-schists, actinolite-schists and amphibolites. Above these is another schist formation, comprising quartzites, clay slates, corundum-schists and porphyroids, and chiastolite-schists, cut by diabase dykes. The corundum porphyroid resembles a feldspar porphry. Large crystals of biotite and large corundum individuals are in a groundmass of quartz and chlorite. The whole rock is besprinkled with quartz grains. Above the schists are bedded fragmentals, with which are associated diabases, quartz-porphyres and amygdaloids. In one of the diabases a diallagic augite and a primary hornblende were detected. In the carboniferous sediments south of Reitzburg are quartz gabbro and quartz diabases, and in the Rhenosterkop in the diamond fields at Driekop, in the Orange Free States, is a quartz-amphibole gabbro containing magnetite, biotite, primary hornblende, diallage and plagioclase. The pyroxene is striated parallell to oP, and is twinned parallel to $\infty P \breve{\infty}$.

The Gabbro of the Adirondacks.—The gabbro associated with anorthosites of the Adirondacks are described by Smyth[4] as very similar to the Baltimore gabbros. They are best developed at Morehouseville and at Wilmurt Lake in the valley of West Canada Creek. The rock is a norite, in some phases a hypersthene-gabbro, both containing a brown hornblende regarded as original. The hypersthene, especially in the foliated varieties of the gabbro, which have been rendered schistose by pressure, sends tongues out into the contiguous feldspar. This stringing out of the pyroxene is so closely connected with the development of the foliation of the rock that it is believed to be a dynamic phenomenon. An analysis of the gabbro gave:

SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O		Total
46.85	18.00	6.16	8.76	8.43	10.17	2.19	.09	.30	=	100.95

A black garnetiferous hornblende gneiss, which is associated with the other gneisses in the neighborhood of the gabbro, is thought to be related to the latter rock, from which it is believed to have been derived by pressure. Around the garnets are rims composed of radiating tongues of hypersthene or of hornblende. Green hornblende is present in the gneiss in addition to the brown variety, and all the other components of the gabbro are represented in either the fresh or the altered condition.

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[3] Neues Jahrb. f. Miner. B. B., ix, p. 174.

[4] Amer. Jour. Sci., xlviii, 1894, p. 54.

The Dykes of the Thousand Islands.—The granites, gneisses and other rocks of the Admiralty Group of the Thousand Islands in the St. Lawrence River are cut by numerous dikes of a dark rock. These, to the number of thirty, have been studied by Smyth.[5] They are all normal diabases and olivine diabases. In the latter variety the olivine is often surrounded by a reaction rim composed of radiating plates of tremolite. The magnetite in many of the rocks of both varieties is separated from the plagioclase by a rim of biotite. This is absent when the mineral is in contact with the other rock components, hence it is regarded as a true reaction rim between the iron oxides and the feldspar.

Analcite-Diabases from California.—A series of dykes, from San Luis, Obispo Co., California, are described by Fairbanks[6] as consisting of two distinct portions. The main one is dark and fine-grained, and the other a hard, light, rock cutting the former in dykes. Both possess the same general features in the thin section, but the lighter rock possesses them in greater perfection. It consists of lath-shaped basic plagioclase, lamellar diallage and analcite. The latter mineral occurs as irregular masses in the feldspar, in wedge-shaped pieces between the plagioclase, in the form of hexagonal or rounded grains partly enclosed within the feldspars, and as the lining of cavities in the rock. It is supposed to have been derived from nepheline, as the mass analysis of the rock shows it to be very rich in sodium:

SiO_2	Al_2O_3	Fe_2O_3	FeO	CaO	MgO	K_2O	Na_2O	H_2O	Cl	Total
50.55	20.48	2.66	4.02	7.30	4.24	2.27	8.37	.44	tr =	100.33

The analcite is changed partly to an aggregate of green fibres, and partly to natrolite. In the wedge-shaped areas between the plagioclase the mineral also contains prehnite crystals, and is bordered here and there by a doubly refracting substance supposed to be a soda feldspar. These are both believed to be alteration products of the analcite.

[5] Trans. N. Y. Acad. Sci., xiii, p. 209.

[6] Bull. Dept. Geol. Univ. Cal., Vol. I, p. 273.

In some of the dykes the structure is ophitic, and in others, panidiomorphic. If the author's view as to the origin of the analcite is correct, these rocks are clearly related to teschnites.

A Quartz-Keratophyre from Wisconsin.—Weidman[7] has investigated the porphyritic rock overlying the Baraboo quartzites of Wisconsin, and has shown it to be a quartz-keratophyre. It shows all the features of a lava, and is associated with tuffs and a sericite schist. The schist is at the contact of the keratophyre with the quartzite, and is evidently a result of shearing of the eruptive. The latter is porphyritic, with plagioclase and anorthoclase phenocrysts (often fractured by movements of the lava), and a few partially dissolved quartz phenocrysts in a fine-grained holocrystalline groundmass of quartz and feldspar, which, in addition to the phenocrysts mentioned, contains imbedded in it ilmenite, biotite and zircon. Many specimens show a fluxion structure and some are spherulitic—the spherules being sometimes secondary and sometimes primary bodies. An analysis of a sample of the rock gave:

SiO_2	Al_2O_3	FeO	CaO	K_2O	Na_2O	H_2O	SO_3	Total
73.00	15.61	1.95	.79	.88	4.95	1.06	.76 =	99.00

The series of bulletins, of which the author's article forms the second number, is well printed and is apparently well edited. It is a valued addition to the list of science bulletins now being published by American colleges.

Notes.—The crystalline limestones of Warren Co., N. J., contain a large number of accessory minerals, which are described by Westgate.[8] It contains irregular masses or concretions of pyroxene, hornblende, magnetite and biotite. Quartz, tourmaline, apatite, graphite and garnet are also present in it. The quartz and pyroxene are so abundant that, in some cases, they constitute rock-bodies, composed of interlocking grains of their principal constituents, with a small admixture of some others.

The nickeliferous pyrrohotite of the Gap Mine, Lancaster, Pa., forms a peripheral zone around the eastern end of an amphibolite lens, which, according to Kemp,[9] is an altered norite or peridotite. The ore is irregularly intermingled with the hornblende of the amphibolite, filling interstices between its crystals. The author is inclined to regard the ore as having separated from the rock magma, but, whether in accordance with the Soret principle, or not, he is unwilling to say.

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[7] Bull. Univ. Wis. Science Ser., Vol. I, p. 35.

[8] Amer. Geologist, Vol. xiv, p. 308.

[9] Trans. Amer. Inst. Min. Engin., Oct.. 1894.

A variolite in a small dyke at Dunmore Head, County Down, Ireland, is described by Cole[10] as an altered glass containing spherulites composed of cryptocrystalline material with a delicately radial structure. Cracks traverse the spherulites and also the groundmass of the rocks. Into some of those in the spherulites glass has been forced. Occasionally the nuclei of spherulites are crystals of plagioclase.

In a general geological article on the Essex and Willsboro' Townships in Essex Co., N. Y., White[11] records the existence of a number of bostonite, fourchite, camptonite and other dykes cutting the country rocks of the region.

GEOLOGY AND PALEONTOLOGY.

The Lakes of Central Africa.—Concerning the origin of the Central African lakes, Dr. D. Kerr-Cross advances the theory that these lakes were in the first instance, arms of the sea, as the Red Sea is at the present time. During Cenozoic time the whole continent participated in a general movement resulting in the crushing, subsidence, faulting, and upheaval which are evident on every hand. The fauna living on during these successive changes has gradually adapted itself to the varying environment. This theory is founded on the following facts collated from the author's own observations, and those of other East African travelers:

1. East Africa is a country of table-lands.
2. Its lakes, Tanganyika, Nyasa, Rulswa, Bangweolo, Newero, and to some extent those further north—not to speak of the lesser lakes—run more or less in the lie of the continent north and south, and are separated from the sea to the east by highland, and are environed by great mountain systems remote from those of the coast range.
3. The lakes are all at high elevation.
4. Some of the lakes have evidence of great volcanic activity having taken place in late geological time. There are recently extinct craters, and hot springs and lava flows.

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[10] Geol. Magazine, April, 1894, p. 220.

[11] Trans. N. Y. Acad. Sci., xiii, p. 214.